TROUBLESHOOTING

This section contains troubleshooting charts to assist you with problems. It contains troubleshooting guidelines for both hardware and weld process problems, including:

- power supply
- weld head
- electrode
- fixture block
- welding process.

Swagelok Welding System (SWS) Repair Procedure

In some cases, the stated remedy to a problem listed in the charts may be “Call for service.” If so, contact your Swagelok representative for over-the-phone troubleshooting.

Be prepared to give the following information to the Swagelok representative:

- serial and model number of the equipment
- complete description of the application
- detailed description of the symptom.

Provide complete details of any problem encountered to your Swagelok representative. Good information helps identify the exact problem and expedite the solution. This applies to problems that can be handled over the phone or those that require the unit to be returned for repair. The result is faster repair times and more assurance that the repair meets with your approval.

Make the Swagelok representative aware if backup equipment is needed to temporarily replace the equipment being returned for repair.

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Repair/Replacement Instructions

Certain remedies require a component, such as a weld head, to be disassembled, cleaned, or replaced. For user maintenance procedures, refer to the **Maintenance** section of the appropriate manual. If in doubt about a procedure, call your Swagelok representative.

Power Supply

Symptom	Cause	Remedy
Front panel screen blank.	The circuit breaker is off.	Turn on circuit breaker.
	The power supply line cord is not plugged in.	Plug power cord into the wall outlet.
The replaced or new ceramic fuse fails immediately when power is turned on.	Internal component failure.	Call for service.
Power supply fan does not operate.	Internal component failure.	Call for service.
Cannot store procedures or weld data on the PC Memory Card.	PC Memory Card write protect switch is on.	Slide the write protect switch on the PC Memory Card to the OFF position.

Note:
The circuit breaker is of the type that must be reset if it trips. Reset the breaker by setting it to the OFF position before turning it on.

Weld Head

Symptom	Cause	Remedy
Rotor does not return to the home position.	Fixture connector is not fully engaged.	Check that the fixture connector is seated and its collar is tight.
	Rotor is not at the home position when the power supply is turned on.	Use **ROTOR JOG** to move the rotor to the home position, then cycle power off and on.
	Dirty home sensor.	Disassemble the weld head and check the home sensor for dirt. See the appropriate motor and power block assembly drawing in the *Power Supply* manual. Use compressed air to blow off debris.
	Rotor gear ring is misaligned with secondary gears.	Realign the rotor with the weld head opening. Refer to the **Maintenance** section of the appropriate weld head user manual.
	Fixture connector has broken or damaged pins/wires.	Call for service.
	Home sensor is damaged or misaligned.	Call for service.
Rotor squeaks when turning.	Dirty or worn weld head body halves.	Disassemble the weld head and clean or replace components.
	Gear bearings worn or dirty.	Clean or replace bearing assemblies as needed.
	Dirty ball bearings in rotor.	Disassemble rotor and clean or replace ball bearings as needed.
Rotor does not move or makes a clicking noise when turning.	Debris on gears.	Check for weld spatter or debris on gears.
	Loose drive clip in the micro weld head.	Check and replace drive clip if needed. See the appropriate micro weld head assembly drawing in the appropriate weld head user manual.
	Brush spring is installed incorrectly in micro weld head.	Install the brush spring in the correct orientation. Refer to the **Maintenance** section of the appropriate weld head user manual.
	Bent motor shaft.	Call for service.

Symptom	Cause	Remedy
Erratic rotor rotation/speed control.	Weld spatter on gears.	Inspect the rotor primary, secondary, and drive gear(s) for damage. Replace damaged gears.
	Arcing damage on rotor gear teeth.	Inspect rotor and replace if damaged.
	Dirty weld head, debris on encoder sensor or encoder wheel.	Disassemble the weld head and clean thoroughly.
	Encoder wheel slips on motor shaft.	Call for service.
	Fixture connector has broken wire.	Call for service.
Arc damage on rotor gear.	Arcing from rotor.	Clean gear, or replace if necessary.
Damage to weld head body halves.	Arcing	Disassemble the weld head. Clean or replace parts as needed. Follow the recommended maintenance schedule outlined in the **Maintenance** section of the appropriate weld head user manual.
	Excessive heat from welding.	Check weld procedure guideline. Use a larger weld head, allow a cooling period between welds, or allow continuous shielding gas flow when welding.
	Weld head was dropped	Check for damage and replace parts as necessary. Check rotor for smooth operation. Call for service if damage is severe.

Electrode

Symptom	Cause	Remedy
Material found on the electrode tip.	Electrode touched the weld puddle.	Replace electrode and check arc gap setting. Check work pieces for out of roundness.
	Weld puddle protrusion.	Check internal purge gas flow rate for excessive back pressure.
	Weld head is not properly attached to the fixture block.	Reattach the weld head to fixture block. Engage the weld head locking lever.
Oxidation film on the electrode.	Insufficient shielding gas.	Increase shielding gas flow rate.
	Insufficient post purge time.	Increase post purge time.
	Partially blocked or cut shielding gas line.	Check for leaks and/or blockages. Replace purge lines if needed.
	O-ring missing between the weld head and motor module. Micro Weld Head Only.	Check and install O-ring if necessary.
	Shielding gas line disconnected inside weld head.	Disassemble weld head and reconnect the line.
Bent or broken electrode.	Electrode was not secured in the rotor.	Replace the electrode. Tighten electrode clamping screws.
	Weld head not correctly attached to the fixture block.	Replace the electrode. Reattach the weld head to the fixture block. Engage the weld head locking lever.
	Incorrect arc gap setting.	Check the length of the electrode and replace it. Reset arc gap.
Melted electrode.	No shielding gas.	Check for shielding gas flow and set the proper flow rate.

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Fixture Block

Symptom	Cause	Remedy
When closing the fixture block side plate, the latch does not lock.	The latch is not inserted into the fixture block side plate completely.	Reinsert the latch into the side plate until it rests against the latch pin.
	Bent latch.	Replace latch.
	Oversized tubing.	Replace fitting/tubing with the correct size.
	Wrong size collets.	Replace with the correct size collet.
	Hinge worn out.	Replace the hinge and dowel pins.
	Worn out latch cam.	Replace the latch cam.
The latch does not fit into the bottom part of the fixture block side plate.	A burr is in the slot or on the latch.	Use a fine file to remove burrs.
	The latch is bent or damaged.	Remove the hinge and replace all damaged parts.
The fixture block does not fit onto the weld head.	The arc gap is incorrect.	Reset arc gap according to the Weld Procedure Guideline.
	The locking ring tab is broken or damaged.	Replace the locking ring tab.
	The weld head is incorrectly assembled.	Reassemble using the instructions found in **Maintenance**.
	Arc damage on fixture.	Clean fixture. Remove and replace any damaged parts.

Welding Process

Symptom	Cause	Remedy
Arc fails to start.	Blown ceramic power supply fuse.	Replace the ceramic power supply fuse with one of the same type and rating.
	Fuse not seated in fuse holder properly or fuse spring is missing.	Insert fuse properly. Replace fuse spring if necessary.
	Incorrect arc gap setting.	Reset the arc gap with the arc gap gage.
	Excessive purge gas flow.	Reduce flow to the value shown on the weld procedure guideline.
	Insufficient shielding gas flow or contaminated shielding gas.	Check the shielding gas source for low pressure. Check gas lines for leaks. Change to a different gas source or change oxygen removal filter.
	Electrode in poor condition.	Replace electrode.
	Damaged electrical connections in the weld head.	Weld head needs repair. Call for service.
	Poor contact between locking ring tab and ground extension.	Inspect and clean all contact surfaces.
	Poor contact between rotor and brush.	Inspect and clean all contact surfaces.
	Poor contact between tubing, collet, and fixture block.	Inspect and clean all contact surfaces.
	Start power set to low.	Set start power to normal.

Note:
All fuses should be rated at 250 V (ac). 110 V (ac) power supplies use a 20 A fuse (1/4 x 1 1/4 in.), 220 V units use a 10 A fuse (5 x 20 mm).

Note:
The ceramic fuse is located on the rear panel of the power supply. See Figure 1.

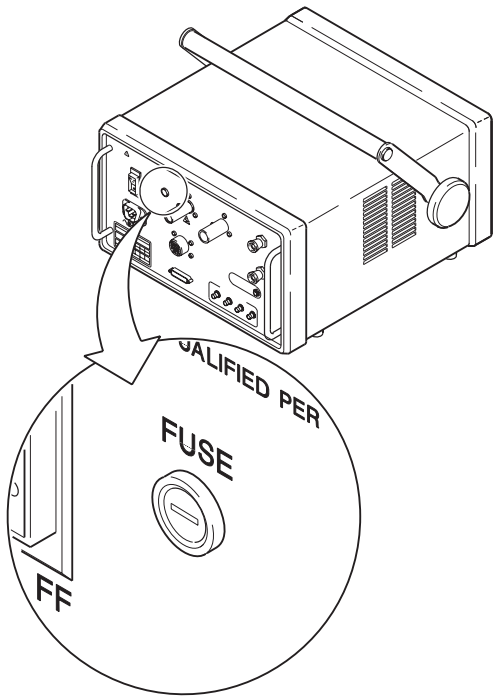

Figure 1 Ceramic Fuse Location

Symptom	Cause	Remedy
Voltage fluctuations during the weld cycle exceeding 2 V.	Weld head not seated properly into the fixture block.	Reattach the weld head to the fixture block. Engage the weld head locking lever.
	Work pieces are out of round.	Replace work pieces if out of standard specifications.
	Insufficient shielding gas flow or contaminated shielding gas.	Check the shielding gas source for low pressure. Check gas lines for leaks. Change to a different gas source or change oxygen removal filter.
Outside diameter discoloration.	Insufficient shielding gas flow.	Increase shielding gas flow rate and prepurge time.
	Impurities in the gas supply.	Check gas lines for leaks. Change to a different gas source or change oxygen removal filter.
	Wrong type of purge gas used.	Change to correct type of purge gas.
	Contamination on work pieces.	Clean the work pieces before welding.
	Contaminants in the weld head and purge lines.	Increase prepurge time. Check the gas source for low pressure.
	Shielding gas line disconnected from the power supply.	Reconnect gas line.
Inside diameter discoloration.	Insufficient internal purge gas.	Increase internal purge gas flow rate and prepurge time.
	Contaminants in the purge line.	Increase prepurge time. Check the gas source for low pressure.
	Migration of oxygen from the internal purge gas exit port of the work pieces to the weld joint.	Reduce exit port size with a purge restrictor. See Note.
	Wrong type of purge gas used.	Change to correct type of purge gas.
	Contamination on work pieces.	Clean the work pieces before welding.
	Nicks/cuts in the internal purge gas line.	Replace gas line.

Note:
The purge restrictor must be of adequate size to prevent excessive inside diameter back pressure.

Symptom	Cause	Remedy
Hole in the weld bead.	Incorrect arc gap.	Reset the arc gap with the arc gap gage.
	Excessive internal purge gas back pressure or surge.	Remove any obstruction of the internal purge gas flow or reduce the pressure.
	Improper tube preparation.	Inspect and reface tubing.
	Incorrect weld parameter setting (impulse).	Check and adjust the weld parameter settings.
	Loss of shield gas flow.	Check the shielding gas source for low pressure. Check gas lines for leaks. Change to a different gas source or change oxygen removal filter.
Concave weld puddle.	Excessive heat input.	Compare the material, wall thickness and outside diameter size of the components you are welding to the weld procedure guideline being used. Verify settings match the guideline and adjust if necessary.
	Insufficient inside diameter purge gas pressure.	Compare flow meter settings to the weld procedure guideline being used. Adjust if necessary.
Electrode touches the work.	Incorrect arc gap.	Reset the arc gap to the table setting in the appropriate weld head user manual.
	Insufficient arc gap for the material or the heat input.	Increase the arc gap by 0.005 in. (0, 13 mm) above the table settings.
	Work pieces are out of round.	Increase the arc gap or replace the work piece.

Symptom	Cause	Remedy
Incomplete inside diameter penetration.	Insufficient heat input.	Compare the power supply setting to the weld procedure guideline being used. Adjust weld parameters as necessary.
	Incorrect weld procedure guideline.	Compare the material wall thickness and outside diameter size of the work pieces being welded to the weld procedure guideline being used. Adjust weld parameters as necessary.
	Incorrect arc gap.	Reset the arc gap with the arc gap gage.
	Tip of electrode is worn or ground improperly.	Change the electrode.
	Inconsistent heats of materials or changes in material chemistry.	Verify consistency of material with material supplier. Adjust weld parameters as necessary.
	Weld joint is off-center or misaligned.	Inspect the entire weld joint n the fixture block prior to welding.
After welding, the tubing/fitting assembly is not straight.	The end surfaces of the work pieces being welded are not perpendicular to their center axis.	Prepare the work piece weld ends properly. Refer to the appropriate weld head user manual.
	The fixture block side plate screws are not tight.	Tighten screws as needed.
After welding, the fitting/tubing joint is still visible.	The fitting/tubing was not centered properly.	Center fitting/tubing.
	The electrode is bent or was not properly installed.	Inspect the electrode and replace if necessary. Reset the arc gap with the arc gap gage.